Closing in on Closure

Hose-in-Hose transfer system being readied to transfer sludge

A new transfer line is now in place in 100-K Area, with pumps, electrical systems and other components being readied to transfer the sludge from the K East Basin to the K West Basin – approximately 42 cubic meters (55 cubic yards). The new system – known as "the hose-in-hose" – or HIH system is important because it will allow the K East Basin to be emptied of its primary radiological inventory and prepared for demolition. According to agreements among the Department of Energy and its regulators, the K East Basin will be emptied and dispositioned first because it is the more contaminated and leak-prone of the two K Basins.

The HIH system will perform "a first-time activity, using unique transfer technology," according to Gene Roosendaal, K West Basin sludge program manager. The line will need four booster pumps to maintain pressure and high velocity in the line – more booster pumps in sequence than have been used in previous applications at Hanford.

Previous experience with transferring dense, radioactive slurries and sludges in Hanford's tank farms was used to design the HIH system. "Although we did learn some things from tank farms," said Dave Vasquez, HIH project manager, "the K Basins sludge is more abrasive – it's physically hard and sharp because it contains tiny particles of uranium. The particles must stay suspended in the hose during transfer, and achieving this condition is very challenging."

KBC

The sludge transfer hose was recently installed in the 100 K Area, between the K East Basin and the K West Basin (all photos).

Vasquez's team of engineers looked at many pumps and configurations, finding that some pump vendors did not have enough experience with the high velocity requirements, nor the ability to provide the necessary extreme robustness of the pump components. Also, they lacked experience in working with uranium oxide.

The hose itself is a double-walled line of steel-reinforced rubber, with the inner diameter purposely kept small – one and one-quarter inch in diameter – to maintain the needed velocity. Traveling at about 15 feet per second, a piece of sludge will make the journey of approximately half-mile between the two K Basins in just under three minutes.

The hose is above ground except in two small sections where it travels under 100-K Area's internal roads. It is equipped with heat trace for freeze protection, and was subjected to exhaustive pressure and impact tests at the vendor's shop to ensure safety.

The system was installed in August and Vasquez said teams assigned to the HIH project "began to perk up and feel enthusiastic. It has been a long, hard road to get the equipment designed and fabricated. Now that people can see the equipment physically on the desert and in the basins, their spirits have been raised." He credited the "commitment of the people of the HIH project, especially operations team lead Phil Sheely. ... These people came together to overcome an enormous number of technical problems."

Remaining construction work on the HIH project includes building three operational control stations to control the sludge movement, one in each basin and one near the middle of the line. Additionally, a flocculant injection system is being installed in the K West Basin, to cause the sludge particles to come out of suspension, bind to each other and drop to the bottom of the receiving containers in that basin. "Once we get the sludge into the K West Basin," said Roosendaal, "we need to minimize any spreading it might do in that basin."

After construction of the whole HIH system is complete in October, testing and training will take place in November and December. Operational Readiness Reviews will follow in January and February. Actual pumping from the four sludge collection tanks now submerged in the K East Basin is expected to occur in February and March, 2006. A schedule of two shifts per day, five days a week is planned. Once the K East Basin sludge has been transferred into the K West Basin, portions of the hose can be moved and re-used for the later transfers of sludge from the K West Basin to the Cold Vacuum Drying Facility where sludge treatment will occur.

"Working with the K Basins sludge in any capacity is challenging," said Roosendaal, "but at least the HIH workscope is well-defined. We know our task and our target, and we're focused on getting it done efficiently and safely." Currently, about 83-percent (35 cubic meters – nearly 46 cubic yards) of the sludge in the K East Basin has been contained. Pumping operations continue to capture the remaining fraction.

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